The output of the sequence correlator 246 feeds into a processing and comparator device 248 (hereinafter processor/comparator 248). The processor/comparator 248 is capable of performing either or both of a processing of the correlated signal. The processing may occur to determine if the received sequence signal is indeed a wake-up signal, i.e. a request to resume communication. In one embodiment the processor 248 may also perform channel analysis to determine the characteristics of the channel. In such an embodiment a comparator may compare the correlated signal to a stored signal, such as a threshold signal, that represents a signal that would be received had a warm start signal be sent. Based on this comparison a determination can be made whether to resume communication. It may be desired to resume communications after a period of inactivity which was entered into to reduce power consumption, heat generation, and/or noise on adjacent communication lines. A warm start operation is one manner to resume communication. It is contemplated that a warm start operation may occur more rapidly than a cold start operation. One factor that may determine whether a warm start operation will occur instead of a cold start operation is changes in channel characteristics.

The channel characteristics may be analyzed and used to modify the communication device settings, possibly on an ongoing basis, to thereby improve operation and reduce the time it takes to resume communication. A comparison may occur between the channel characteristics at a time prior to the end of the period of inactivity and current channel characteristics obtained by the analysis. This comparison

may reveal the extent of the changes and the appropriateness of a warm start operation or a cold start operation.

It is further contemplated that the transmission and detection of a sequence signal may occur for any desired reason other than to initiate a warm start operation. By way of example and not limitation, use of a sequence signal may also be used to for synchronization, channel estimation or fault identification.Accordingly, the output of the processor/comparator 248 connects to other aspects of a communication system 250. The communication system may comprise any type communication system. One communication system 250 comprises a system conforming to a digital subscriber line (DSL) standard. Another communication system 250 comprises a cable modem. The invention may be implemented with any communication system 250.

Figure 3 illustrates a more detailed block diagram of an example embodiment of the transmitter 200 shown in Figure 2. It should be understood that this is an example embodiment provided for purposes of enablement. The invention is not limited to this example embodiment. The transmitter 200 includes a data input 300 connected to a scrambler 304. The output of the scrambler 304 feeds into a signal mapper 308, which in turn connects to a transmit filter 312. The output of the transmit filter 312 provides the filtered signal to a digital to analog converter 316, the output being connected to an analog filter 322. The output of the analog filter 322 provides a signal that is eventually coupled to or is transmitted on the line 202.

The scrambler 304 manipulates received signals to generate a generally random bit sequence in an attempt to output a data stream without long sequences of constant voltage or repeated patterns. Long consecutive bit sequences can cause wide variations in the received power level as well as difficulties for adaptive equalization and clock recovery. In one embodiment the scrambler is embodied using a shift register with feedback connections. A de-scrambler, assumed to be located in the receiver, may comprise a shift register with feed-forward connections. In one embodiment the scrambler is embodied to generate periodic sequences. The signals generated in this case are particularly well suited for wake-up signals. The operation of the scrambler 304 in relation to the invention is described below in detail.

The signal mapper 308 transforms the digital output of the scrambler to the various signal levels that represent each of the bit values. For example, four bits of digital data may be represented as 16 PAM, i.e. any of 16 different numerical values. The 16 different values may be represented on a scale of minus one to one in increments of 1/8. The signal is ultimately scaled by an amplifier to yield a desired transmit power. In one embodiment the signal mapper 308 comprises a table lookup device or process that translates the binary input to numeric output.

The transmit filter 312 is configured to manipulate the output data to adhere to desired or required spectral requirements. For example, frequency filtering may occur to improve system performance by tailoring the frequency content of the output or it may simply be mandated by FCC or a standards organization. It may be desired to attenuate